

SUBSTANCE OF INTERVIEW

Applicant hereby provides a write-up on the substance of interview as required by MPEP 713.04. A telephone interview was conducted among the Applicant's representative J.D. Harriman II (Reg. 31,967), Examiner Paul Ip, and Examiner Phillip Nguyen. Claim 1 was discussed over prior art Lee (No. 6,316,281). Mr. Harriman requested the withdrawal of the final rejection, stating that the micro-machined stand-offs in claim 1 is different from the stand-offs cited in the Lee reference. Examiner Ip did not agree based on what was claimed in claim 1. Examiner Ip suggested that the attorney modify claim 1 by adding the limitation recited in claim 2 and also take out the limitation "silicon-dioxide and silicon-oxynitride". Examiner Ip also suggested amendments be submitted after final for further consideration.

REMARKS

Claims 1-4, 6, 8, 9, 11, and 12 were rejected in the present patent application. In light of the remarks stated in the office action and the suggestion made by Examiner Ip in the interview dated September 26, 2003, Applicant has amended claims 1 and 3 and canceled claim 2. Claim 31 has also been added.

Applicant respectfully requests that final rejection be withdrawn and that the Examiner reconsiders pending claims 1, 3-4, 6, 8, 9, 11-12, and 31 in the present patent application in view of the amendments and remarks.

Rejection under 35 USC 112, second paragraph

Claims 1-4, 6, 8, 9, and 11-12 were rejected under 35 USC 112, second paragraph. In response, Applicant has amended the claim 1 and moved the limitation of claim 2 into claim 1, as suggest by Examiner Ip during the interview. Claim 2 has been canceled and Applicant hereby presents the amended claims to overcome the Examiner's rejection.

Rejection under 35 USC 102(b)

Claims 1, and 8 were rejected under 35 USC 102(b) as being anticipated by Lee et al. Applicant respectfully disagrees with the rejection of these claims. In particular, Applicant submits that the Lee does not anticipate claim 1 because Lee fails to teach, describe, or suggest the limitations:

- (a) "soldering a semiconductor optical gain chip to a micromachined silicon bench to create an internal element of said laser; and"
- (b) coupling said optical gain chip to a ~~silicon dioxide and silicon oxynitride~~ based waveguide, wherein said waveguide terminates in an external feedback element, wherein said external feedback element comprises Bragg gratings and said step of coupling further comprises:
 - (b1) using a flip-chip aligner-bonder to horizontally align the coupling of said gain chip to said waveguide; and

(b2) using a plurality of micromachined stand-offs manufactured by
micromachine process to vertically align the coupling of said gain chip to said
waveguide”

With regarding to limitation (b2), Applicant points out that Lee describes using standoffs that are formed by “base metal deposition and electroplating” (col. 8, lines 34-37). In contrast, the stand-offs as claimed in the present invention is “manufactured by micromachine process.” Thus, as amended, this limitation is clearly not taught by Lee. Lee teaches using standoffs that are formed by electroplating generally do not allow good control of the deposited layer thickness, with usually a range of 0.5 micrometer accuracy for 5 micrometer tall stand offs. Bumpy surface on the standoffs made by electroplating may also add more inaccuracy. Applicant hereby submits two references showing the inaccuracy of the bumps. In the first reference entitled “Electroplated electro-fluidic interconnects for chemical sensors”, in particular stand-offs (bumps) made by electroplating is shown in Fig. 4a to have a surface roughness of 4 microns (page 164, lines 12-15). The second reference entitled “Microbump Formation by Noncynaide Gold Electroplating” shows figures of rough surface in stand-offs produced by the process of electroplating.

In contrast, the present invention uses stand-offs that are micro-machined to generate vertical alignment within 0.2 microns accuracy. Since the Lee patent is focused on making hybrid optical integrated circuits, the precision required is much less than that of the present invention. As shown by the reference, Applicant points out the difference in method of manufacture of stand-offs used does play a significant role in the vertical alignment of the laser.

It is known in the art that, to have an effective hybrid laser, the gain chip must send light to the feedback element (Bragg grating or otherwise) fabricated in the external waveguide and get some of the light reflected back with minimal loss in between. As stated in the Applicant's last reply, the vertical alignment must be good to +/- 0.2 micron (page 16 of the specification describes the precise alignment needed to achieve a coupling loss of less than 1 dB). Using micro-machined standoffs makes this possible.

Furthermore, with regard to limitation (a), Lee does not describe a "waveguide terminates in an external feedback element, wherein said feedback element comprises Braggs gratings." In terms of functionality, the lasers in Lee provide lasing action independent of the external waveguide circuits. Unlike the feedback element in present invention, the external circuit in Lee adds functionality, but is not controlling or causing the laser action. In Lee's case, there is no feedback element defined in the external waveguide to affect the lasing action. For this reason also, the loss due to mode mismatch between the laser and the waveguide occurs only once when the light is emitted from the laser into the external circuit. Unlike the present invention, there is no reflection in the Lee device.

Rejection under 35 USC 103(a)

The Examiner has rejected claims 2-4, and 6 under 35 USC 103 as being unpatentable over Lee ('281) in view of Bestwick ('210). Applicant respectfully disagrees with the basis that Examiner used in rejecting these claims. As Bestwick does not teach the use of standoffs "manufactured by micromachine process", the *prima facie*

rejection of these claims based combination of Bestwick and Lee cannot be maintained.

As claim 12 now depends on claim 3, its 103(a) rejection is overcome as well.

The Examiner has rejected claims 9 and 11 under 35 USC 103 as being unpatentable over Lee ('281) in view of Freeman ('793). Again, the same arguments apply to these claims with regard to Lee. As Freeman does not teach the use of stand-offs "manufactured by micromachine process" and overcome the lack of teaching of these elements in Lee, the *prima facie* rejection of these claims based combination of Freeman and Lee cannot be maintained. Their 103(a) rejection is overcome as well.

CONCLUSION

The Examiner has rejected claims 1-4, 6, 8, 9 and 11-15. Applicant has amended claims 1 and 3 cancelled claim 2, and replied to the Examiner's rejection. Applicant respectfully requests reconsideration of pending claims in the present patent application in view of the amendments and remarks. Applicant submits that pending claims 1, 3, 4, 6, 8, 9 and 11-12 are now in a condition for allowance.

Respectfully submitted,

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By

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